UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,892	03/21/2005	Yoshiyuki Ueno	IPE-051	9982

20374 7590 03/18/2009

KUBOVCIK & KUBOVCIK
SUITE 1105
1215 SOUTH CLARK STREET
ARLINGTON, VA 22202

EXAMINER	
SYKES, ALTREV C	
ART UNIT	**PAPER NUMBER**
1794	

MAIL DATE	DELIVERY MODE
03/18/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/524,892	UENO ET AL.	
	Examiner	Art Unit	
	ALTREV C. SYKES	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 19-40* is/are pending in the application.

4a) Of the above claim(s) *19-39* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 February 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment to the claims filed December 29, 2008 is acknowledged by examiner and has been entered. Claims 19-39 are withdrawn from consideration. Claim 18 has been cancelled. Claims 1-17 and 40 are pending examination on the merits.

Response to Arguments

2. Applicant's arguments filed December 29, 2008 have been fully considered but they are not persuasive.

Applicants traverse the rejections against claims 1-17 and 40 by arguing that the primary reference Kasai discloses only a hydrophilic polymer which may be cross-linked by itself. Applicant argues Kasai does not disclose bonding a hydrophilic polymer to a substrate or irradiating a substrate with radiation while the substrate is brought into contact with an aqueous solution of a hydrophilic polymer.

Examiner finds the argument against the cross-linking of the hydrophilic polymer of Kasai to be non-persuasive as that limitation is not recited in the claims. Regarding the limitation that the hydrophilic polymer be bonded to a substrate, examiner notes that bond is defined by the Merriam-Webster Online Dictionary as to cause to adhere firmly, to embed in a matrix, and to hold together in a molecule or crystal by chemical bonds. It is further noted that applicant discloses a hydrophilic polymer is immobilized on the surface of the substrate. (See instant specification [0019]) The term immobilization refers to a state in which a hydrophilic polymer is bonded with a substrate. (See instant specification [0014]) Kasai discloses a hydrophilic polymer may be deposited on the

surface of the hydrophobic membrane. (See Col 6, lines 38-42) Therefore, examiner notes that the coated and impregnated substrate with a hydrophilic polymer as disclosed by Kasai et al. would meet the limitations of applicant. Regarding the limitation that the substrate be obtainable by irradiating with radiation, examiner notes that applicant only requires that the substrate be capable of undergoing such treatment. As the structure and composition of Kasai et al. has been shown to be similar to that of the structure and composition as claimed by Applicant, it is presumed that the prior art can do whatever is claimed since the similarity is substantial. As such, it is noted that the modified substrate of Kasai et al. is also capable of being obtained by irradiating with radiation while the substrate is brought into contact with an aqueous solution of the hydrophilic polymer and even further with an antioxidant.

Finally, examiner notes that applicant provides no traversal arguments against the secondary references applied in the last mailed office action.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-5, 7, 10-11, 13-17, 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Kasai et al. (US 4,776,959) as evidenced by Graiver et al. (US 5,429,839)

Regarding claims 1 and 40 Kasai et al. discloses a hydrophilic porous membrane which comprises a porous membrane of a hydrophobic polymer and a coating formed on

at least one surface of the porous membrane and on the inner surface of the pores of the porous membrane with a water-soluble hydrophilic polymer soluble in a solvent exhibiting satisfactory stability and a satisfactory wetting property with respect to the hydrophobic polymer mentioned above. (See Col 2, lines 35-44) Examiner equates the porous hydrophobic membrane of Kasai et al. to the precursor substrate as claimed by applicant. Regarding the limitation of the ratio of hydrophilic polymer not bonded to the surface of the precursor substrate to the total amount of the hydrophilic polymer of the modified substrate, Kasai discloses that the concentration of the hydrophilic polymer in the solution is generally in the range of 0.1 to 10.0% by weight, although it is variable with the average pore diameter possessed by the porous membrane of the hydrophobic polymer subjected to the treatment of impregnation. (See Col 5, lines 25-31) Kasai et al. also discloses that the amount of hydrophilic polymer is preferably in the range of 0.05 to 1 parts by weight per 100 parts of the hydrophobic polymer. (See Col 5, lines 55-58) Therefore, examiner notes that the hydrophilic polymer is used in an amount of less than 15% by weight in solution and for the impregnation of the membrane. Therefore Kasai anticipates a membrane wherein hydrophilic polymer is not bonded to the surface of a membrane since the hydrophilic polymer is deposited on the inner surface of the pores of the membrane as well as the surface. Regarding the limitation that the number of adhered human blood platelets is $10/4.3x10^3$ μm^2 or less when the modified substrate is brought into contact with human blood which contains heparin with a concentration of 50 U/mL at 37° C for one hour. It is noted by examiner that heparin is a component added to human blood as an anticoagulant, therefore, the number of adhered blood platelets would

be minimal since the whole idea of adding the compound is to avoid clotting of the platelets. Additionally, Kasai discloses a membrane capable of use for artificial organs such as artificial kidney and blood plasma separation. (See Col 6, lines 43-50) Kasai discloses in the final filter , true fungi, bacteria, and microfine particles entrained by the transfusion fluid are stopped by the hydrophilic porous membrane. Therefore, only the cleaned transfusion fluid is passed through the filter thereby suggesting to one of ordinary skill in the art that substantially no blood platelets would adhere to the substrate when placed in the conditions as claimed by applicant. As evidenced by Graiver et al. (US 5,429,839) using polyvinyl alcohol coatings, substantially reduces the adsorption of proteins and the adhesion of blood platelets. (See Col 6, lines 49-52)

Regarding claims 2 and 4, as the structure and composition of Kasai et al. has been shown to be similar to that of the structure and composition as claimed by Applicant, it is presumed that the prior art can do whatever is claimed since the similarity is substantial. As such, it is noted that the modified substrate of Kasai et al. is also capable of being obtained by irradiating with radiation while the substrate is brought into contact with an aqueous solution of the hydrophilic polymer and even further with an antioxidant.

Regarding claims 3 and 5, Kasai teaches the claimed invention above. While the reference does not explicitly disclose the modified substrate wherein in the aqueous solution of the hydrophilic polymer, the maximum increasing value of ultraviolet absorption value in the wavelength range of 260 to 300 nm, the increase being caused by irradiating with radiation, is 1 or less, it is reasonable to presume that the maximum

increasing value is inherent to Kasai. Support for said presumption is found in the use of like materials and/or like methods which would result in the claimed property. In the instant case, Kasai et al. discloses a modified substrate comprising a hydrophilic polymer which is capable of being made by irradiating with radiation as set forth above. Additionally, the maximum increasing value as claimed is 1 or less wherein less is understood to encompass zero. The burden is upon the Applicant to prove otherwise. *In re Fitzgerald* 205 USPQ 594. In addition, the presently claimed properties would inherently have been present once the Kasai et al. substrate is provided. Note *In re Best*, 195 USPQ at 433, footnote 4 (CCPA 1977).

Regarding claims 10, 13 and 14, Kasai teaches the claimed invention above. While the reference does not explicitly disclose the modified substrate wherein in the amount of dissolution of the hydrophilic polymer is 0.5 mg/m^2 or less, and does not explicitly disclose the modified substrate wherein in the adsorptivity to interleukin-6 is at least 0.1 ng/cm^2, it is reasonable to presume that the amount of dissolution is inherent to Kasai. It is also reasonable to presume that the immobilization density of the polyalkylene glycol is 150 to 3,000 mg/m^2 is inherent to Kasai et al. since it has been shown that Kasai et al. discloses a membrane substantially similar in choice of hydrophilic polymer and the final use of the product substrate which would result in the claimed property. Support for said presumption is found in the use of like materials and/or like methods which would result in the claimed property. In the instant case, Kasai et al. discloses a modified substrate comprising a hydrophilic polymer which excels in properties such as resistance to heat and resistance to chemicals. (See Col 3, lines 40-46)

Kasai et al. also discloses that the porous membrane encompasses a hydrophilic polymer in a solvent exhibiting a satisfactory ability to dissolve the hydrophilic polymer and possessing high stability and a high wetting property with respect to the hydrophobic polymer. (See Col 4, lines 25-32) Additionally, the amount of dissolution as claimed is 0.5 mg/m^2 or less wherein less is understood to encompass zero. Kasai et al. discloses a modified substrate similar in composition to that of the applicant. Furthermore, Kasai et al. discloses that the hydrophilic porous membrane finds utility as a final filter for medicinal liquids and transfusion liquids, pharmaceutical filters, and membranes for artificial organs such as artificial kidney and blood plasma separation. (See Col 6, lines 43-53 and Figure 2) The burden is upon the Applicant to prove otherwise. *In re Fitzgerald* 205 USPQ 594. In addition, the presently claimed properties would inherently have been present once the Kasai et al. substrate is provided. Note *In re Best*, 195 USPQ at 433, footnote 4 (CCPA 1977).

Regarding claims 7, 9, 11, and 15-17 Kasai et al. further discloses a modified substrate wherein:

- the substrate comprises a plurality of hydrophilic polymers. (See polymethylmethacrylate Col 6, lines 24-37)

- the substrate comprises an anionic hydrophilic polymer and a nonionic hydrophilic polymer. (See Col 5, lines 9-23)

- the hydrophilic polymer is a polyalkylene glycol or polyvinylpyrrolidone. (See Col 5, lines 6-23)

- the substrate comprises a hydrophobic polymer. (See Col 2, lines 35-55)
- the hydrophobic polymer is polymethylmethacrylate. (See polymethyl methacrylate-polyethylene glycol in Col 5, lines 9-23 where polyethylene glycol is hydrophilic)
- the substrate is a medical substrate. (See Col 6, lines 43-50)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasai et al. (US 4,776,959) as applied to claim 1 above in view of Graiver et al. (US 5,429,839)

Regarding claim 6, Kasai et al. discloses all of the claim limitations as set forth above but the reference does not disclose the surface hydrophilic polymer ratio is at least 20 weight percent.

Graiver et al. discloses an aqueous coating composition for solid substrates formed from hydrophobic polymers, said composition comprising a solubilized hydrophilic organic polymer. (See Col 4, lines 9-28) Polyvinyl alcohol is a preferred hydrophilic polymer based on the cost and availability of this material. (See Col 4, lines 59-60) The useful upper limit for the concentration of polyvinyl alcohol is determined at least in part by the viscosity of the solution and the capabilities of the equipment used to

prepare the solution and coat it on the substrate. (See Col 5, lines 35-38) Using the preferred molecular weight range of from 80,000 to 115,000 the upper limit of polymer concentration appears to be 20 weight percent. (See Col 5, lines 39-41) Graiver discloses that substrates coated in such a way are suitable for artificial implants and other medical devices. (See Col 6, lines 42-52)

As both Kasai et al. and Graiver et al. are both directed to hydrophilic polymer on hydrophobic substrates, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention motivated by expected success to utilize the weight percent of hydrophilic polymer as taught by Graiver et al. for the hydrophilic polymer on the surface of the substrate as taught by Kasai et al. since Graiver discloses that substrates coated in such a way are suitable for artificial implants and other medical devices. (See Col 6, lines 42-52)

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasai et al. (US 4,776,959) as applied to claim 7 above in view of Nagatomo et al. (US 5,023,052).

Regarding claim 8, Kasai et al. discloses all of the claim limitations as set forth above. Kasai further discloses the hydrophilic polymer may be vinyl acetate-vinyl pyrrolidone copolymer which is noted to be nonionic. (See Col 5, lines 9-23) Kasai discloses that an additional polymer may be used. (See Col 6, lines 30-37) The reference does not disclose the substrate comprises a cationic hydrophilic polymer and a nonionic hydrophilic polymer.

Nagatomo et al. discloses an element for dry chemical analyses useful for quantitative determination of a specific substance in body fluids, such as blood. (See Col 1, lines 5-7) The analytical element may have various layer structures, for example a layer structure (1) comprising a support having provided thereon the first non-fibrous porous layer, the second non-fibrous porous layer. (See Col 5, lines 25-30) Additionally, Nagatomo et al. discloses a layer structure (2) comprising a support having provided thereon an adhesive layer (or water absorbing layer). (See Col 5, lines 30-35) A third structure taught by Nagatomo et al. comprises a support having provided thereon a detecting layer which generally comprises a hydrophilic polymer and may contain a mordant, for example a cationic polymer mordant. (See Col 48-58)

As both Kasai et al. and Nagatomo et al. discloses products useful in blood plasma separation, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention motivated by expected success to utilize a cationic polymer as taught by Nagatomo et al. as the additional on the substrate of Kasai et al. having a nonionic polymer thereon for the added benefit of enhancing the separation substrate to analyze a specific component in whole blood, thereby giving a highly precise result irrespective of the hematocrit value of the blood. (See Col 2, lines 54-61)

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasai et al. (US 4,776,959)

Regarding claim 9, Kasai et al. discloses all of the claim limitations as set forth above. Kasai et al. further discloses when the hydrophobic polymer is polyvinylidene fluoride, for instance, such examples include vinyl alcohol-vinyl acetate copolymers, random and block copolymers of vinyl pyrrolidone such as vinyl acetate-vinyl pyrrolidone copolymer, polyethylene glycol block copolymers such as polymethyl methacrylate-polyethylene glycol block copolymer, segmented polyurethane having polyethylene glycol as a soft segment thereof, and block and random polyamino acids combining hydrophilic amino acids with hydrophobic amino acids. (See Col 5, lines 9-23) Kasai et al. discloses since the vinyl alcohol-vinyl acetate copolymer has desirable affinity for polyvinyl fluoride, a hydrophilic membrane may be produced by having the vinyl alcohol-vinyl acetate copolymer incorporated in a certain proportion into polyvinylidene fluoride during the production of a polyvinylidene fluoride membrane. When this method is adopted, it is enabled to vary the strength of a porous membrane and obtain a hydrophilic membrane answering the purpose of its use by simultaneously incorporating therein an additional polymer such as polymethyl methacrylate which has satisfactory affinity for polyvinyl fluoride and is capable of enhancing the hardness of the resin. (See Col 6, lines 24-37) Although, Kasai et al. does not specifically disclose the substrate comprises an anionic hydrophilic polymer and a nonionic hydrophilic polymer, the reference does disclose that an additional polymer may be added to the membrane to answer the purpose of its use. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention motivated by expected success to utilize the

disclosure of Kasai et al. to add additional hydrophilic polymers thereby tailoring the substrate for end product use.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasai et al. (US 4,776,959) as applied to claim 1 above in view of Ricketts et al. (US 2,715,091).

Regarding claim 12, Kasai et al. discloses all of the claim limitations as set forth above but the reference does not disclose the hydrophilic polymer is a polymer derived from the living body. It is noted that applicant discloses that examples of hydrophilic polymers derived from the living body include dextran and dextran sulfate. (See [0030])

Ricketts et al. discloses anticoagulants for use with blood and plasma which are non-toxic and may be readily prepared on a large scale. (See Col 1, lines 18-21) Ricketts et al. also discloses a water soluble salt of dextran sulphate as a anticoagulant which like heparin may be successfully employed after blood has been shed "in vitro" or used within the body "in vivo". (See Col 1, lines 44-46 and Col 2, lines 17-22)

As Kasai et al. discloses a hydrophilic porous membrane which can be used as a final filter for blood plasma transfusion and Ricketts et al. also discloses the manufacture of anticoagulants for use with blood and plasma, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the anticoagulant dextran sulphate of Ricketts et al. as the hydrophilic polymer on the substrate of Kasai et al. in order to produce a final membrane that would prevent blood from clotting while the membrane was being used as a final filter for a transfusion. One of ordinary skill in the art would have been motivated by expected success since it is

recognized by Ricketts that dextran sulphate can be produced in large quantities and at low cost. (See Col 1, lines 63-66)

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALTREV C. SYKES whose telephone number is (571)270-3162. The examiner can normally be reached on Monday-Thursday, 8AM-5PM EST, alt Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on 571-272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/
Supervisory Patent Examiner, Art Unit 1794

/ACS/
Examiner
3/5/09